

International Rectifier

PRELIMINARY

IRF7413A

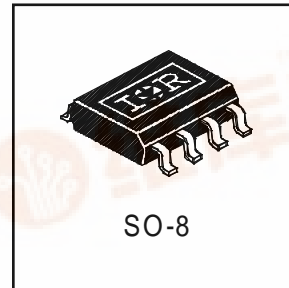
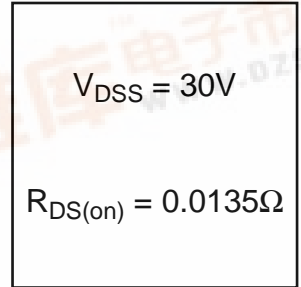
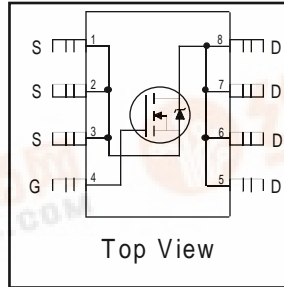
HEXFET® Power MOSFET

- Generation V Technology
- Ultra Low On-Resistance
- N-Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	12	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	8.4	
I_{DM}	Pulsed Drain Current ①	58	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.5	W
	Linear Derating Factor	0.02	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy②	260	mJ
dv/dt	Peak Diode Recovery dv/dt ③	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance Ratings

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient④	—	50	°C/W



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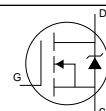
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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.034	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ ⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.0135	Ω	$V_{GS} = 10V, I_D = 6.6A$ ④
		—	—	0.020		$V_{GS} = 4.5V, I_D = 3.3A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Transconductance	10	—	—	S	$V_{DS} = 10V, I_D = 3.7A$ ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$
Q_g	Total Gate Charge	—	52	79	nC	$I_D = 7.3A$
Q_{gs}	Gate-to-Source Charge	—	6.1	9.2		$V_{DS} = 24V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	16	23		$V_{GS} = 10V$, See Fig. 6 and 9 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	8.6	—	ns	$V_{DD} = 15V$
t_r	Rise Time	—	50	—		$I_D = 7.3A$
$t_{d(off)}$	Turn-Off Delay Time	—	52	—		$R_G = 6.2\Omega$
t_f	Fall Time	—	46	—		$R_D = 2.0\Omega$, See Fig. 10 ④⑤
C_{iss}	Input Capacitance	—	1800	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	680	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	240	—		$f = 1.0\text{MHz}$, See Fig. 5 ⑤

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	58		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 6.6A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	74	110	ns	$T_J = 25^\circ\text{C}, I_F = 7.3A$
Q_{rr}	Reverse Recovery Charge	—	200	300	nC	$di/dt = 100A/\mu s$ ③⑤



Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Starting $T_J = 25^\circ\text{C}$, $L = 9.8\text{mH}$
 $R_G = 25\Omega, I_{AS} = 7.3A$. (See Figure 12)

③ $I_{SD} \leq 7.3A, di/dt \leq 100A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

⑤ Use IRF7413 data and test conditions

⑥ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.

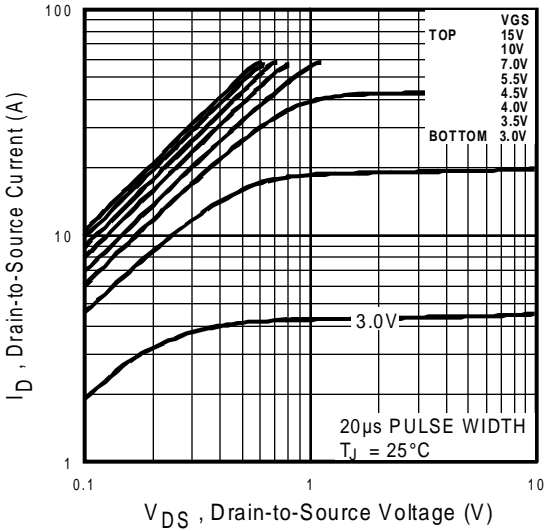


Fig 1. Typical Output Characteristics

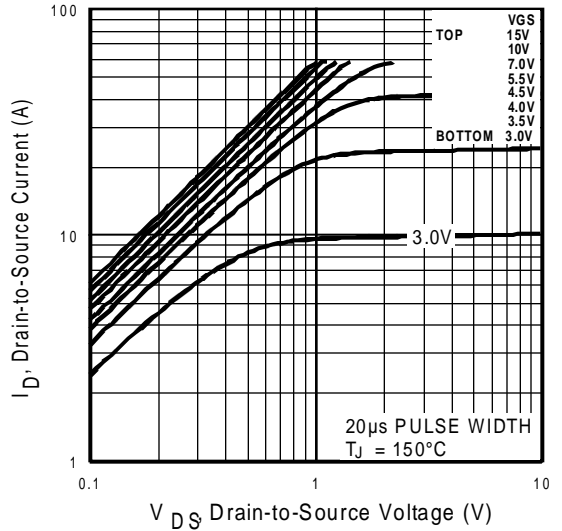


Fig 2. Typical Output Characteristics

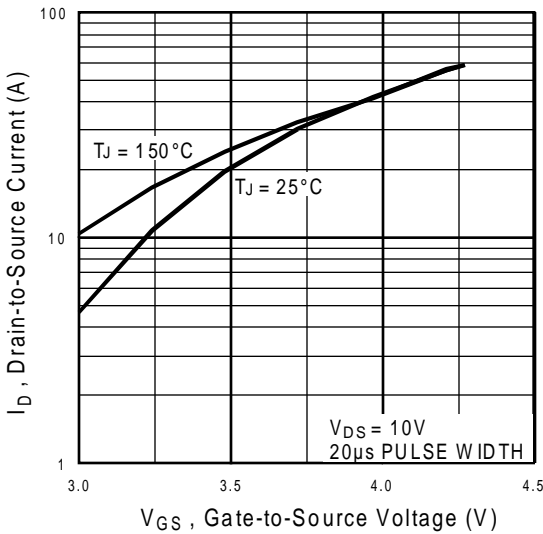


Fig 3. Typical Transfer Characteristics

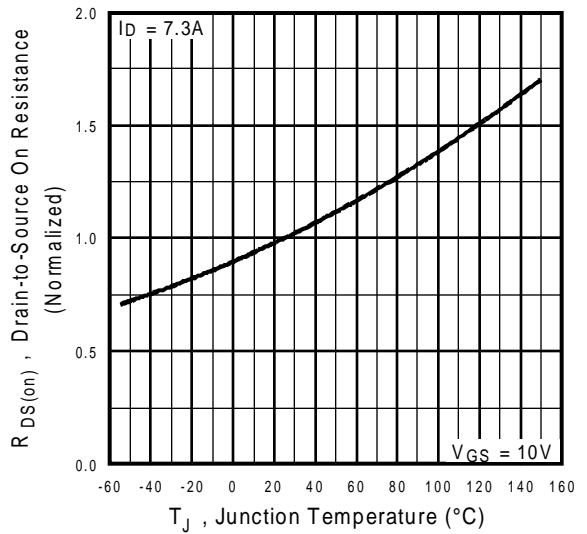


Fig 4. Normalized On-Resistance Vs. Temperature

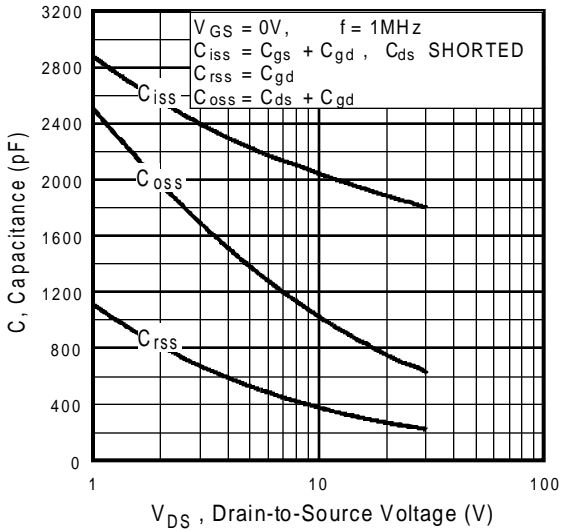


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

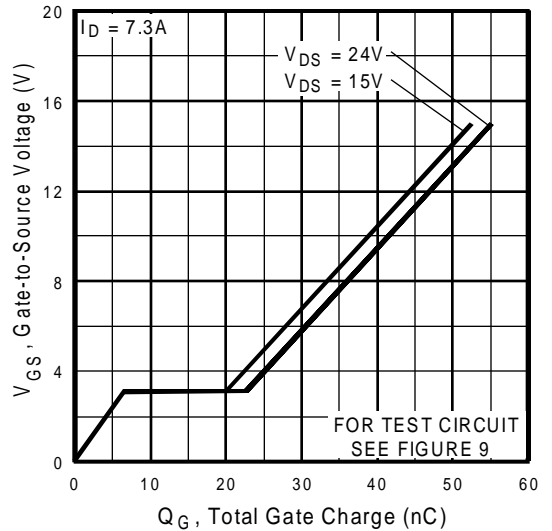


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

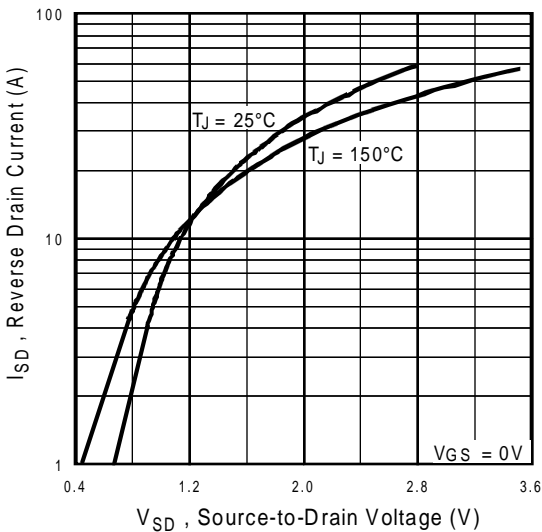


Fig 7. Typical Source-Drain Diode Forward Voltage

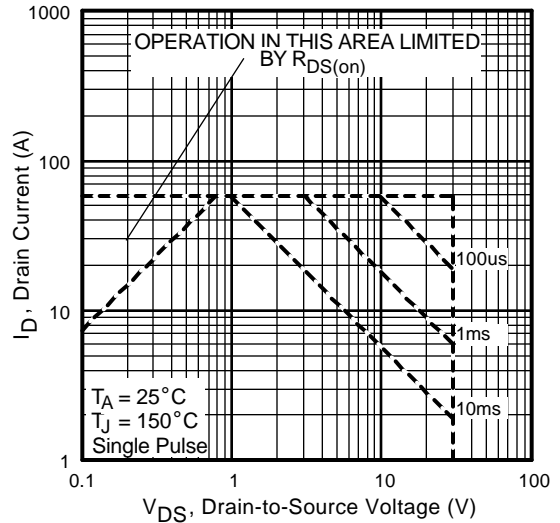


Fig 8. Maximum Safe Operating Area

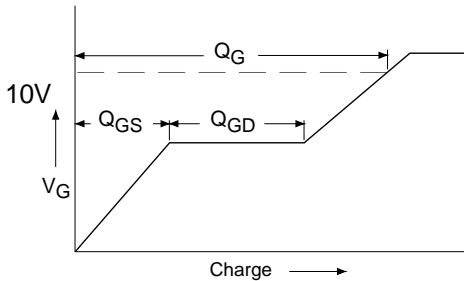


Fig 9a. Basic Gate Charge Waveform

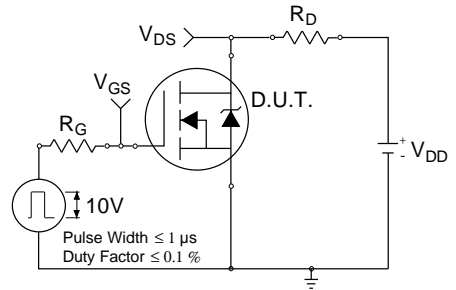


Fig 10a. Switching Time Test Circuit

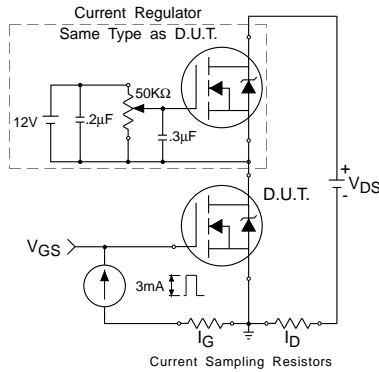


Fig 9b. Gate Charge Test Circuit

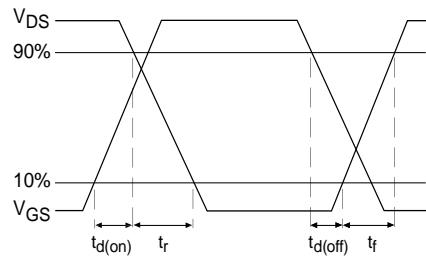


Fig 10b. Switching Time Waveforms

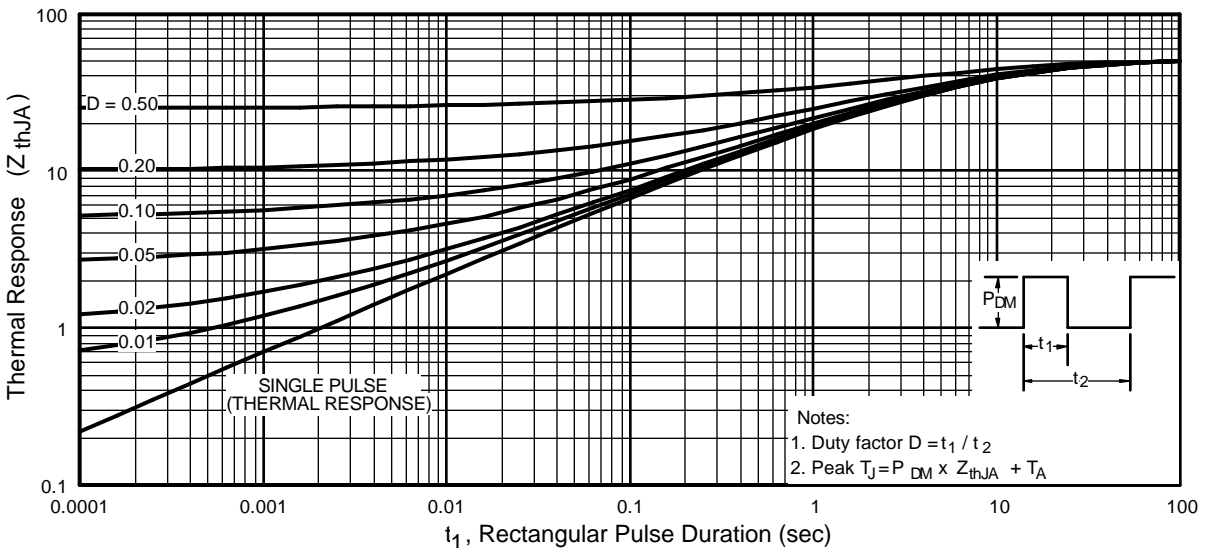


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

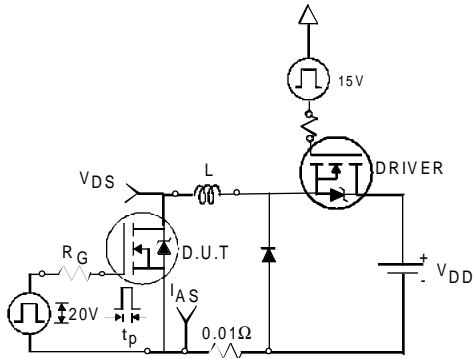


Fig 12a. Unclamped Inductive Test Circuit

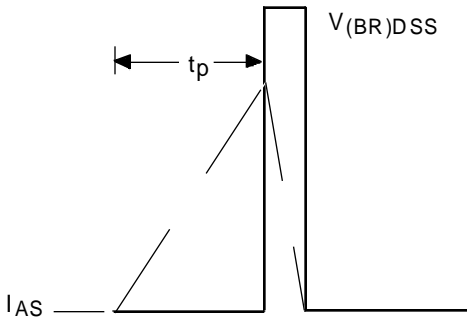


Fig 12b. Unclamped Inductive Waveforms

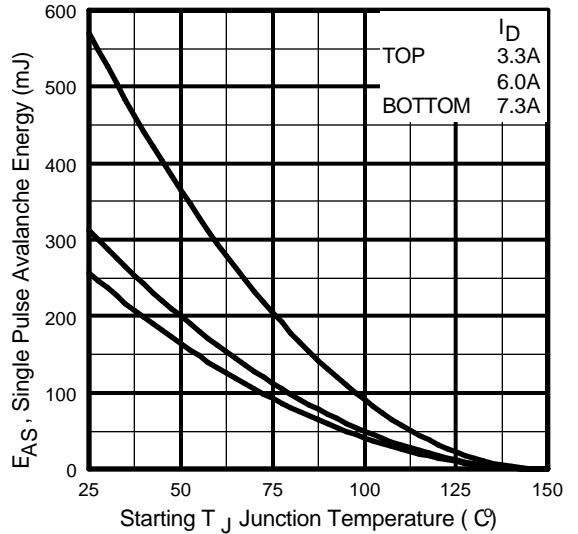
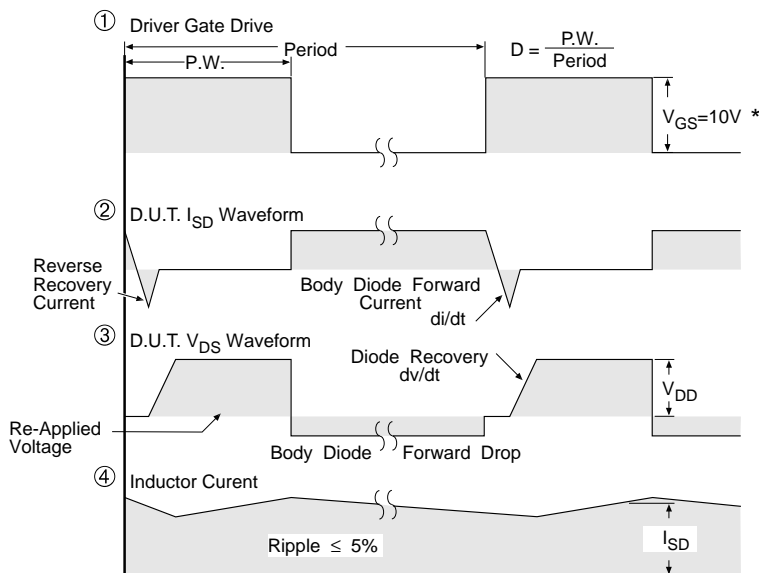
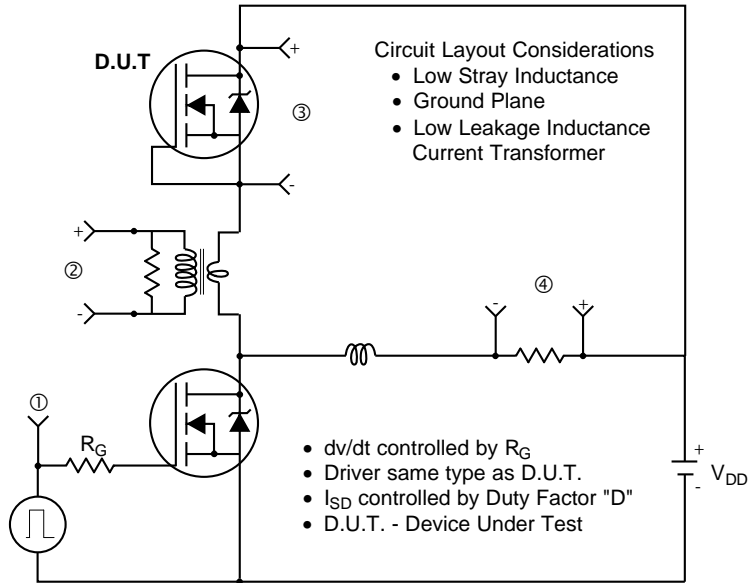


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

Peak Diode Recovery dv/dt Test Circuit



* $V_{GS} = 5V$ for Logic Level Devices

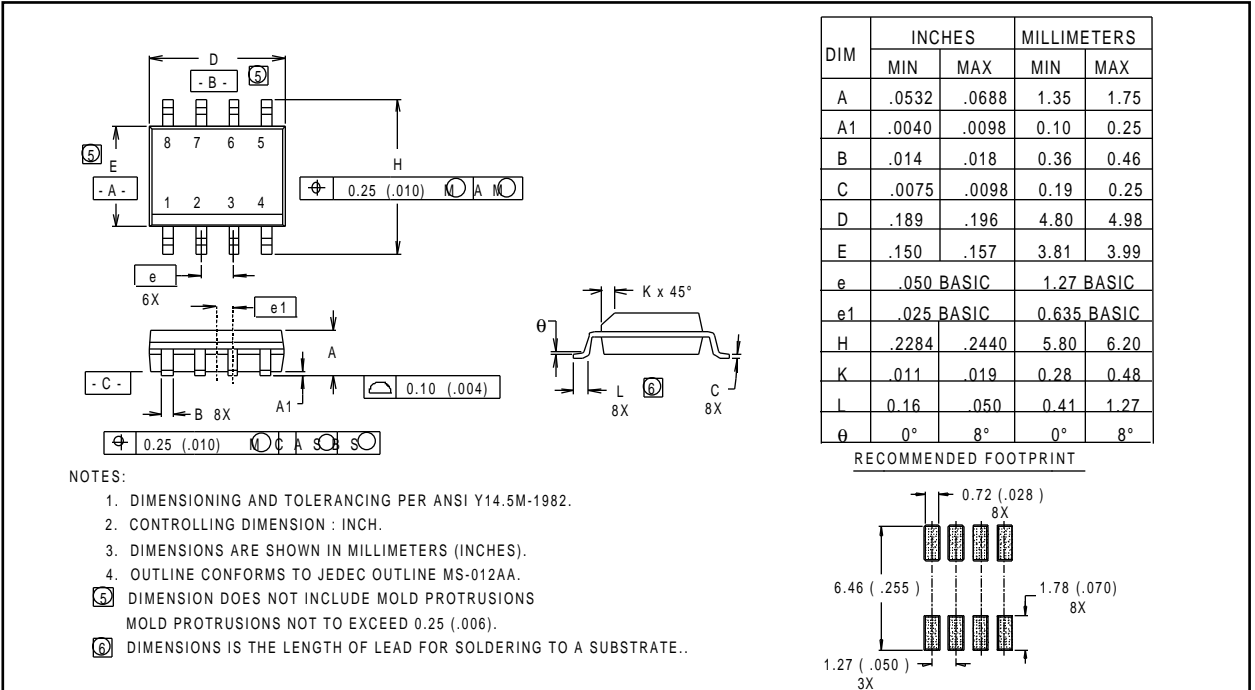
Fig 13. For N-Channel HEXFETS

IRF7413A

Package Outline

SO8 Outline

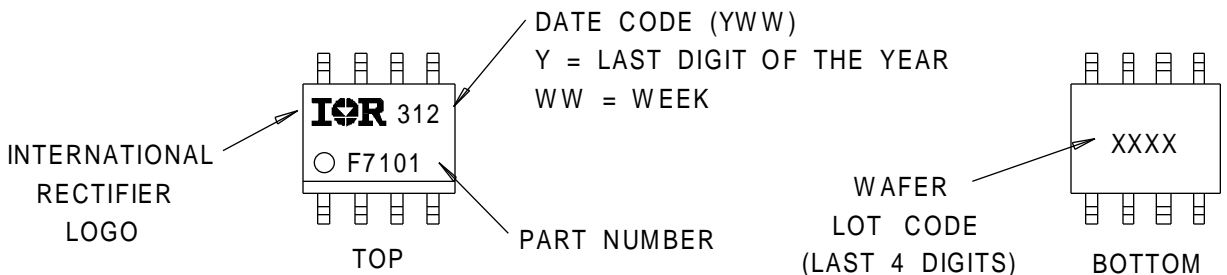
Dimensions are shown in millimeters (inches)



Part Marking Information

SO8

EXAMPLE : THIS IS AN IRF7101



Tape & Reel Information

S08

Dimensions are shown in millimeters (inches)

